"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

Davydov, A. S. On the theory of a particle with a spin 3/2. Akad. Nauk SSSR. Zhurnal Eksper. Teoret. Fiz. 17, 427–436 (1947). (Russian. English summary)

A spin-vector form of writing down equations for a particle with a spin 3/2 in the case when external fields are present is discussed in the paper. The case is considered of a particle having a zero stationary mass. The relation between the equations obtained and those proposed by Rarita and Schwinger is discussed. *Author's summary.*

Source: Mathematical Reviews, 1948, Vol 9, No. 3

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USSR/Physics Sep/Oct 48
Spectra, Absorption

"Theory of the Absorption Spectra of Some Polyatomic Molecules," A. S. Davydov, Phys Inst, Acad Sci Ukrainian SSR, 1 3/4 pp

"Zs Ak Nauk SSSR, Ser Fiz" Vol XII, No 5 p.644-5

Existing methods of calculating energy states of polyatomic molecules are unsatisfactory. Three methods are usually used: (1) valence bonds, (2) molecular orbits, and (3) antisymmetrical molecular orbits. Davydov describes new method based on antisymmetrical wave-

19/49T86

USSR/Physics (Contd) Sep/Oct 48

functions. Gives synopsis of his paper and discussion which ensued.

19/49T86

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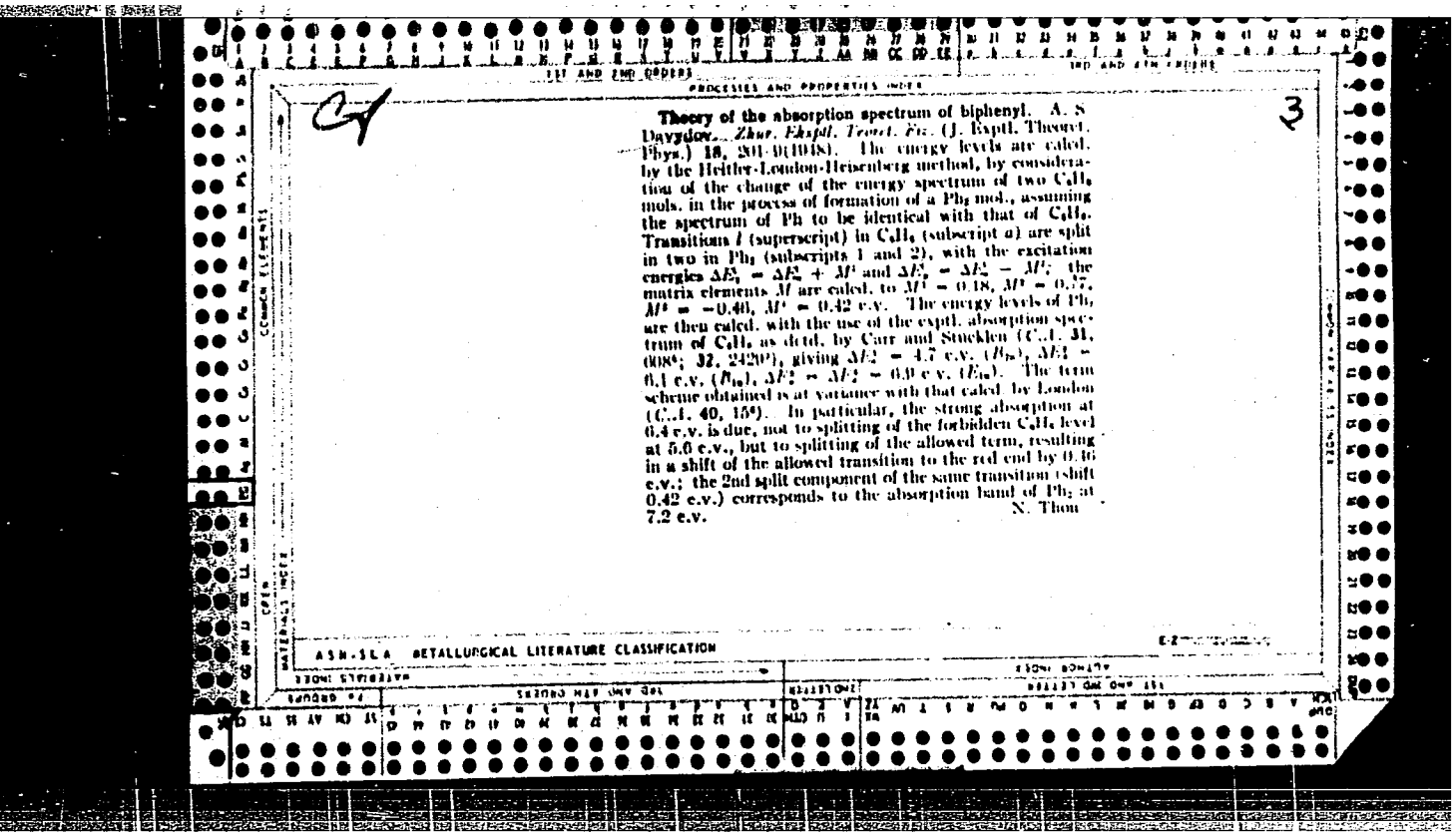

PROCESSES AND PROPERTIES INDEX

Theory of the absorption spectrum of biphenyl. A. S Davydov. *Zhur. Eksptl. Teoret. Fiz.* (J. Exptl. Theoret. Phys.) **18**, 201-9(1948). The energy levels are calcd. by the Heitler-London-Heisenberg method, by consideration of the change of the energy spectrum of two C_6H_6 mols. in the process of formation of a Ph_2 mol., assuming the spectrum of Ph to be identical with that of C_6H_6. Transition l (superscript) in C_6H_6 (subscript a) are split in two in Ph_2 (subscripts 1 and 2), with the excitation energies $\Delta E_1^l = \Delta E_a^l + M^l$ and $\Delta E_2^l = \Delta E_a^l - M^l$; the matrix elements M are calcd. to $M^1 = 0.18$, $M^2 = 0.17$, $M^3 = -0.40$, $M^4 = 0.42$ e.v. The energy levels of Ph_2 are then calcd. with the use of the expt. absorption spectrum of C_6H_6, as detd. by Carr and Stuckler (C.A. 31, 6088; 32, 2420[9]), giving $\Delta E_a^1 = 4.7$ e.v. (B_{1u}), $\Delta E_a^2 = 6.1$ e.v. (B_{1u}), $\Delta E_a^3 = \Delta E_a^4 = 6.9$ e.v. (E_{1u}). The term scheme obtained is at variance with that calcd. by London (C.A. 40, 159[6]). In particular, the strong absorption at 6.4 e.v. is due, not to splitting of the forbidden C_6H_6 level at 5.6 e.v., but to splitting of the allowed term, resulting in a shift of the allowed transition to the red end by 0.16 e.v.; the 2nd split component of the same transition (shift 0.42 e.v.) corresponds to the absorption band of Ph_2 at 7.2 e.v.

N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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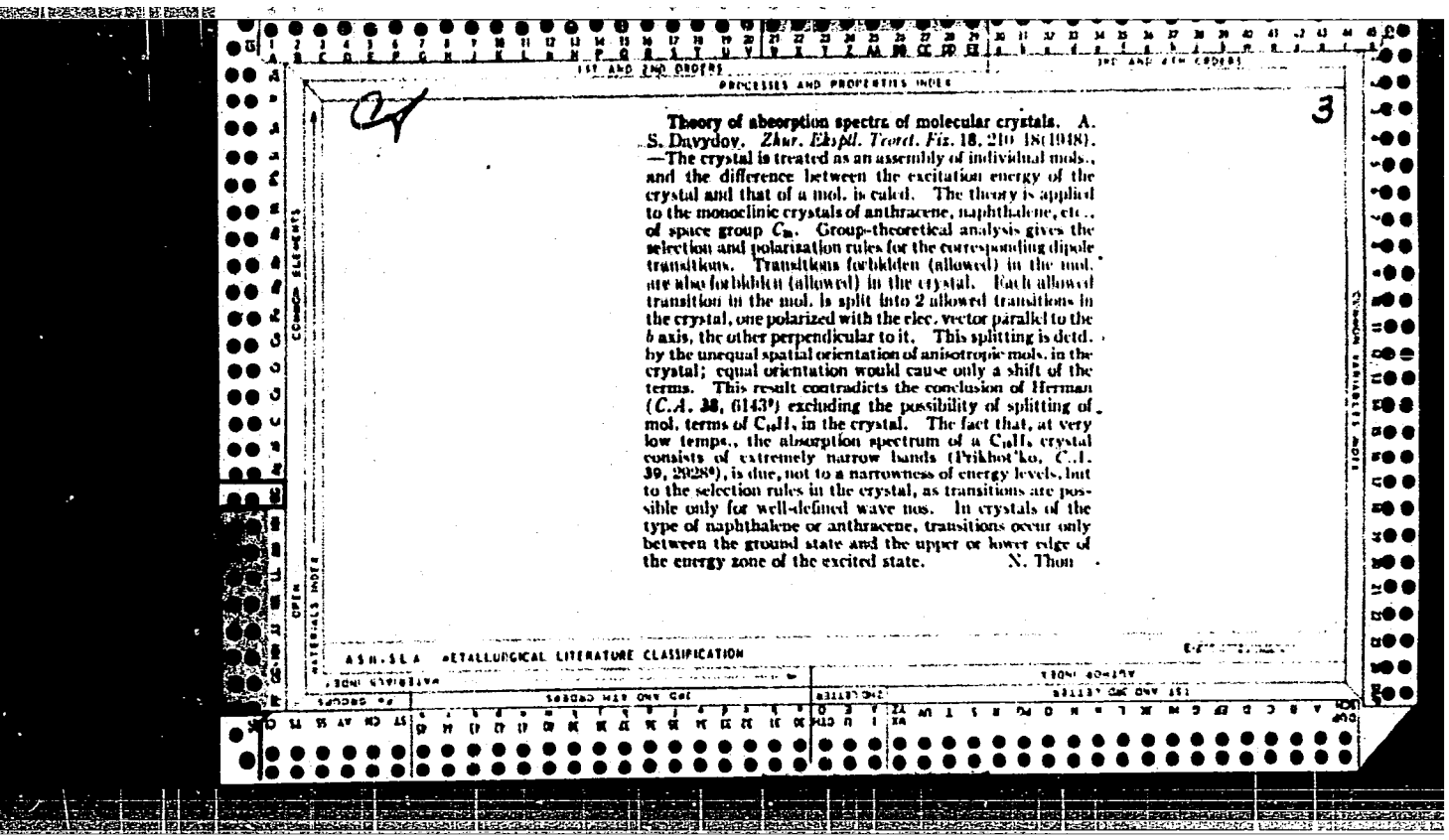

PROCESSES AND PROPERTIES INDEX

3

Theory of absorption spectra of molecular crystals. A. S. Davydov. *Zhur. Eksptl. Teoret. Fiz.* 18, 210–18(1948). —The crystal is treated as an assembly of individual mols., and the difference between the excitation energy of the crystal and that of a mol. is calcd. The theory is applied to the monoclinic crystals of anthracene, naphthalene, etc., of space group C_{2h}. Group-theoretical analysis gives the selection and polarization rules for the corresponding dipole transitions. Transitions forbidden (allowed) in the mol. are also forbidden (allowed) in the crystal. Each allowed transition in the mol. is split into 2 allowed transitions in the crystal, one polarized with the elec. vector parallel to the *b* axis, the other perpendicular to it. This splitting is detd. by the unequal spatial orientation of anisotropic mols. in the crystal; equal orientation would cause only a shift of the terms. This result contradicts the conclusion of Herman (*C.A.* **38**, 6143⁹) excluding the possibility of splitting of mol. terms of C_6H_6 in the crystal. The fact that, at very low temps., the absorption spectrum of a C_6H_6 crystal consists of extremely narrow bands (Prikhot'ko, *C.A.* **39**, 2928⁸), is due, not to a narrowness of energy levels, but to the selection rules in the crystal, as transitions are possible only for well-defined wave nos. In crystals of the type of naphthalene or anthracene, transitions occur only between the ground state and the upper or lower edge of the energy zone of the excited state. N. Thon

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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CA

Theory of the absorption spectra of solutions of metals in ammonia. A. S. Davydov. (Phys. Inst., Acad. Sci. Ukr. S.S.R., Kiev). *Zhur. Eksptl. Teoret. Fiz.* 18, 913–16 (1948).—On the basis of the accepted dissocn. of the atoms of the metals dissolved in liquid NH_3 into a pos. ion and a free electron, the electrons are described in terms of Pekar's polaron theory, whereby the mass of the electron, maintained in a localized state as a result of the polarization of the medium by the elec. field of the electron, is replaced by an effective mass μ, and the medium is described by its macroscopic refractive index n and dielec. const. ϵ. The energy of the ground state $1s$ of the polaron, in units of (μ/m) 27.09 e.v., is $E_{1s} = -0.101\ c^2$, where $c = (1/n^2) - (1/\epsilon)$, and the energy change of the transition $2p \rightarrow 1s$ is $\Delta E = 0.071c^2 = (\mu/m)\ 0.888$ e.v.; from the expt. $\Delta E = 0.7$ e.v., it follows that $\mu/m = 1.33$. Excitation of the polaron to the $2p$ state produces a change of the polaron well and this, in turn, produces a change of the state of the electron, until a new self-consistent state is established. This is shown to correspond to 2 energy levels, -0.568 and -0.444 e.v.; whether the polaron is excited to one or the other level depends on the polarization of the absorbed light. From that excited state the electron can pass to the non-selfconsistent state E'_{1s} with emission of 0.107 e.v., and thence to E_{1s}. The energy of the optical dissocn. of the polaron is thus $= -1.617$ e.v. In a liquid, and in contrast to a solid crystal, polarization is essentially inelastic, and the optical dissocn. energy of the polaron is not different from its thermal dissocn. energy. N. Thon

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DAVYDOV, A. S.

USSR/Physics Jun 48

Light - Absorption
Chemistry - Polyphenyls

"Dependence of the Frequency of the Absorption of Light of p-Polyphenylenes on the Number of Phenyl Groups," A. S. Davydov, Inst of Phys, Acad Sci Ukrainian SSR, 4 pp

"Zhur Eksper i Teoret Fiz" Vol XVIII, No 6

Theory is developed for dependence of frequency and intensity of absorption of light on length of chain of p-polyphenyls. Good agreement is obtained with experimental data.

6/49T97

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

USSR/Physics Nov 48
Wave Functions
Mathematics, Applied

"Calculating the Nonorthogonal Quality of Wave Functions by the Molecular-Orbit Method," A. S. Davydov, Chair of Theoretical Phys, Kiev State U, 3 3/4 pp

"Zhur Fiz Khim" Vol XXII, No 11

Develops a simple formula with which, given results determined by the molecular-orbit method without computation of the overlapping integrals of the wave functions, values can be obtained with calculation of these integrals. Submitted 24 Feb 48.

56/49T103

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

Davydov, A. S.
25363

Otvet A. S. Davydova Na Pisbmo L. A. Blyumenfelbda //<<Po Povodu Statbi A. S. Davydova <<Vychislenie Nizshikh Elektronnykh Urovney Molekuly Naftalina>> <<Zhrnale Eksperim. I Teoret Fiziki>> 1948, Vyp. 77
Zhrnal Eksperim. I Teoret. Fiziki, 1948, Vyp. 7, s 671-72

SO: LETOPIS NO. 30, 1948

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A.S. DOC PHYSICOMATH SCI

Dissertation: "Theory of Light Absorption by Molecular Crystals."

26 Sep 49

Physics Inst imeni P.N. Lobedev, Acad Sci USSR

SO Vecheryaya Moskva
Sum 71

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

USSR/Physics Feb 49
Absorption, Molecular
Crystallography

"The Molecular Theory of Pleochroism," A. S. Davydov, Inst of Phys, Ukrainian SSR, 7 pp

"Zhur Eksper i Teoret Fiz" Vol XIX, No 2

Attempts to construct molecular theory of pleochroism of molecular crystals. Assumes energy states of individual molecules are known. Investigates alteration of energy spectrum when molecules combine into a crystal of any symmetry. Shows it is possible that new "crystalline" absorption bands may appear, which vanish when crystal is melted. Shows, using crystals

32/49T84

USSR/Physics (Contd) Feb 49

containing two and four molecules in a single crystalline nucleus as an example, that the frequency of absorbed light will depend on the directions of propagation and polarization. Submitted 5 Jul 48.

32/49T84

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

USSR/Physics
Oscillations
Molecular Structures

Feb 49

"The Effect of Molecular Interaction in a Lattice on Intramolecular Oscillations," A. S. Davydov, Inst of Phys, Acad Sci Ukrainian SSR, 1½ pp

"Zhur Eksper i Teoret Fiz" Vol XIX, No 2

Derives equation for oscillation frequency with the assumption that molecules are rigidly connected. Explains conditions for which this assumption is valid.

32/49T78

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

Davydov, A.S.

Davydov, A. S. The theory of dispersion of molecular crystals in the infrared region. Akad. Nauk SSSR. Zurnal Eksper. Teoret. Fiz. 19, 930–936 (1949). (Russian) MR 10

The problem of dispersion of crystals is studied by using a one-dimensional model. Intramolecular vibrations and lattice vibrations are considered. The interaction between these two kinds of vibration leads to the appearance of a secondary maximum in the absorption curve, which loses the symmetrical form found for gases. The approximations should be good for infrared rays and very low temperatures, but the results may also have some relevance for other regions of the spectrum and higher temperatures.

W. H. Furry (Cambridge, Mass.).

Inst. Physics AS Ukr SSR

Source: Mathematical Reviews, Vol 12 No. 8

CA 47 no 21:10994 '53

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

BA 165T108

USSR/Physics - Dispersion Aug 50

"Theory of the Dispersion of Molecular Crystals, II," A. S. Davydov, Inst of Phys, Acad Sci Ukrainian SSR

"Zhur Eksper i Teoret Fiz" Vol XX, No 8, pp 760-766

On example of one-dimensional crystal, Davydov investigates influence of interaction of intramolecular oscillations with rotational qualities of molecules upon curve of dispersion and absorption for frequencies corresponding to intramolecular oscillations. Submitted 27 Feb 50.

[redacted]

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CR

3

Theory of luminescence of molecular crystals. A. S. Davydov. *Izvest. Akad. Nauk S.S.S.R., Ser. Fiz.* 15, 655-7(1951); cf. *C.A.* 44, 4325e.—In mol. crystals 2 types of excitation are possible: (1) leading to exciton waves throughout the crystal; (2) leading to localized states. In the second case the absorption band does not show the influence of the structure of the crystal, and its polarization is given by the orientation of the mol.; i.e. the absorption is the same as in soln. The luminescence is absent or weak. In the first case there are several strongly polarized bands which can be derived from calcns. of the unit cell. Such excitation leads to strong luminescence when excitons spread to spots with lattice defects or spots capable of emitting or absorbing phonons. S. Pakswer

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S. A.

Sect. A

Optics · Spectra

535.343.2 : 539.132

3489. The theory of the absorption of light by crystalline benzene. A. S. DAVYDOV. *Zh. Eksper. Teor. Fiz.*, 21, 673–6 (No. 6, 1951) In Russian.

It is shown that by examining the absorption spectrum of polarized light it is possible to establish the symmetry of the electronic transitions in the molecule of benzene.

A. L. MACKAY

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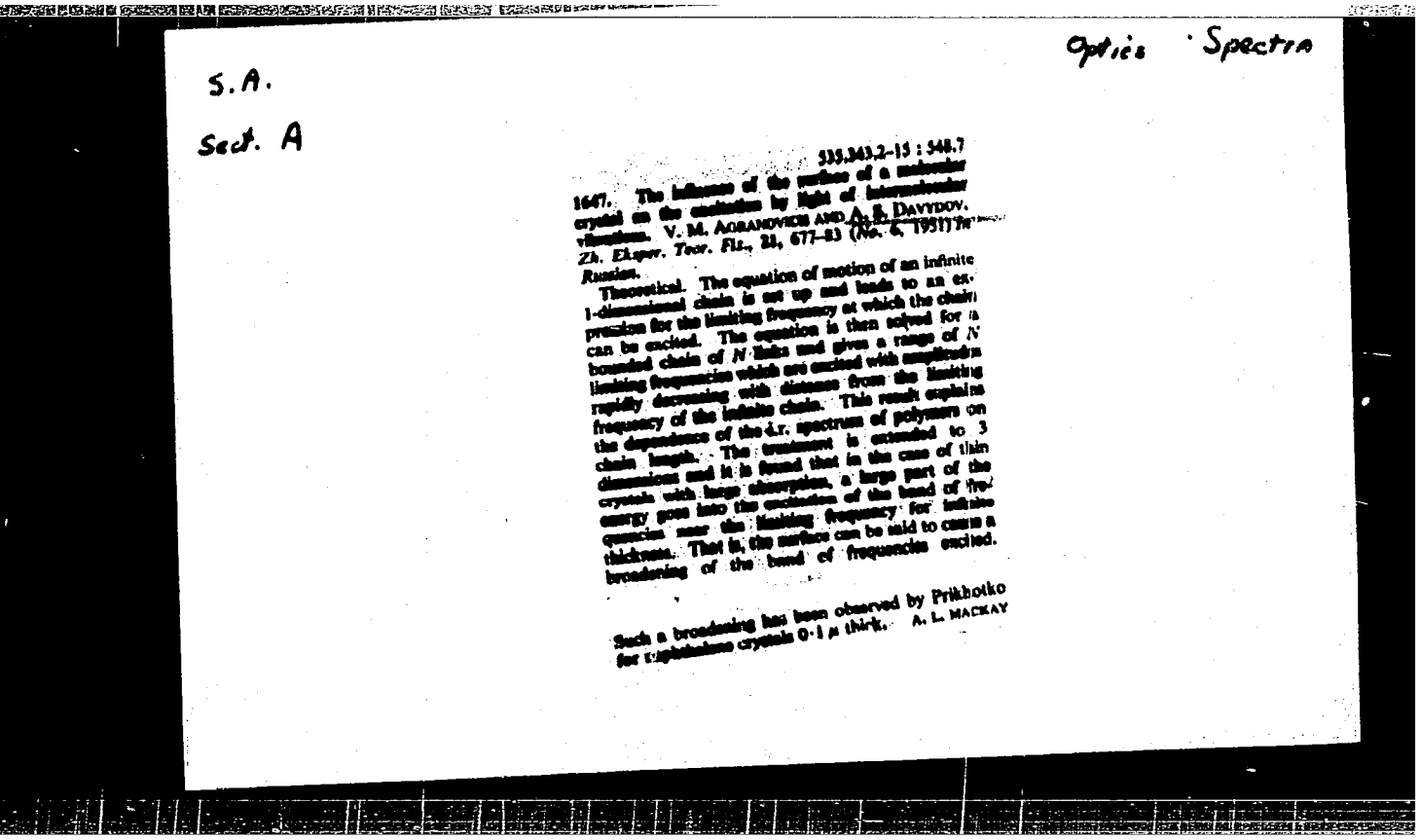

S.A.

Sect. A

Optics · Spectra

535.343.2-15 : 548.7

1647. The influence of the surface of a molecular crystal on the excitation by light of intramolecular vibrations. V. M. AGRANOVICH AND A. S. DAVYDOV. *Zh. Eksper. Teor. Fiz.*, 31, 677–83 (No. 4, 1951) In Russian.

Theoretical. The equation of motion of an infinite 1-dimensional chain is set up and leads to an expression for the limiting frequency at which the chain can be excited. The equation is then solved for a bounded chain of N links and gives a range of N limiting frequencies which are excited with amplitudes rapidly decreasing with distance from the limiting frequency of the infinite chain. This result explains the dependence of the i.r. spectrum of polymers on chain length. The treatment is extended to 3 dimensions and it is found that in the case of thin crystals with large absorption, a large part of the energy goes into the excitation of the band of frequencies near the limiting frequency for infinite thickness. That is, the surface can be said to cause a broadening of the band of frequencies excited.

Such a broadening has been observed by Prikhotko for naphthalene crystals 0·1 μ thick. A. L. MACKAY

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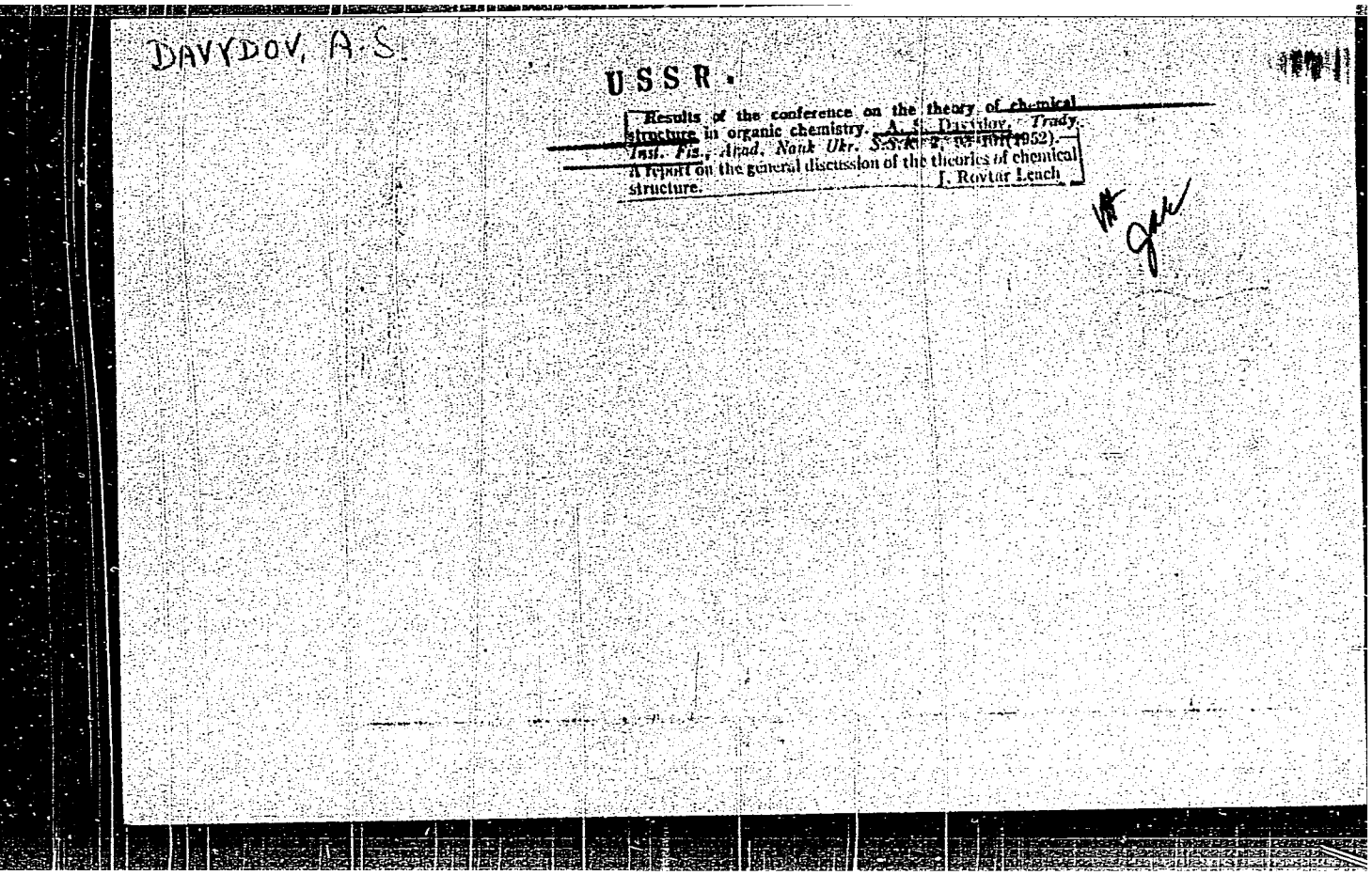

DAVYDOV, A.S.

USSR

Results of the conference on the theory of chemical structure in organic chemistry. A. S. Davydov. *Trudy. Inst. Fiz., Akad. Nauk Ukr. S.S.R.* 2, 65-101(1952). A report on the general discussion of the theories of chemical structure.
J. Rovtar Leach

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

The Committee on Stalin Prizes (of the Council of Ministers USSR) in the fields of science and inventions announces that the following scientific works, popular scientific books, and textbooks have been submitted for competition for Stalin Prizes for the years 1952 and 1953. (Sovetskaya Kultura, Moscow, No. 22-40, 20 Feb - 3 Apr 1954)

Name	Title of Work	Nominated by
Davydov, A. S. Prikhot'ko, A. F. Obreimov, I. V.	Research in the field of the spectrosocopy of molecular crystals	Academy of Sciences, Ukrainian SSR

SO: W-30604, 7 July 1954

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

USSR/Physics - Dispersion of light FD-490

Card 1/1 : Pub. 146-7/18

Author : Davydov, A. S.

Title : Theory of absorption, dispersion and scattering of light by solutions

Periodical : Zhur. eksp. i teor. fiz., 24, 197-209, Feb 1953

Abstract : Obtain general formulas determining the shape of the curves of absorption, dispersion and scattering of light and their dependence in temperature and the other parameters characterizing the oscillations of the atoms of the solvent and their interaction with the dissolved molecules in various energy states. 3 references, including 1 foreign.

Institute : Physics Institute, Acad. Sci Ukrainian SSR

Submitted : September 16, 1952

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

USSR

539.13 : 535.37

10377. Theory of emissionless transitions in molecules in solutions. A. S. DAVYDOV. *Zh. eksper. teor. Fiz.*, 24, No. 4, 397–410 (1953) *In Russian.*

Probabilities are calculated for emissionless transitions of the excitation energy of a molecule into the vibration energy of the atoms of (solid or liquid) solvents, and *vice versa*. It is shown that these probabilities depend on (1) the temperature, (2) the displacement of equilibrium positions of the solvent atoms when the energy state of the molecule undergoes a change, and (3) the way in which wave-functions which determine the state of the molecule in the solution react to the change of co-ordinates of the solvent atoms. The part played by emissionless transitions in the phenomena of luminescence and photoconductivity is stressed. F. LACHIAN

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S.

USSR/Physics - Luminescence

Card 1/1 Pub. 43 - 43/62

Authors : Borisov, M. D., and Davydov, A. S.

Title : Luminescence of molecular crystals containing foreign molecules

Periodical : Izv. AN SSSR. Ser. fiz. 18/6, 714-715, Nov-Dec 1954

Abstract : The absolute energetic yield of luminescence by a naphthalin crystal containing various anthracene concentrations was investigated by the known sphere method. The anthracene concentration in the naphthalin crystal was determined by the anthracene absorption spectra. Photos of the luminescence spectra for naphthalin crystals with anthracene as an admixture made it possible to determine whether the anthracene penetrated the naphthalin lattice in the form of individual molecules or in the form of crystalline formations. One USSR reference (1948-1951). Graph.

Institution : Acad. of Sc., Ukr. SSR, Phys. Inst.

Submitted : .....

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A.S.

Theory of light absorption and dispersion in solutions. Pt.2.
Nauk zap.Kyiv.un. 14 no.8:5-13 '55. (MLRA 9:10)

(Solutions--Optical properties)

APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982(

"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVDOV, A. S.

USSR/Optics - Physical Optics, K-5

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35749

Author: Agranovid, V. M., Davydov, A. S.

Institution: None

Title: Absorption and Luminescence Spectra of Polyatomic Molecules

Original Periodical: Nauk. zap. Kiivs'k. un-t., 1955, 14, No 8, 15-20

Abstract: Starting with the idea that the polyatomic molecule can be considered to some approximation as a complex system, obeying statistical laws, a determination was made of the shape of the absorption bands and of the fluorescence bands of bomplicated molecules, characterized by not too strong an interaction between the electronic and oscillatory states (Neporent, B. S., Eksperim. i teor. fiziki, 1951, 21, 172). It is shown that the Levshin mirror-symmetry law should hold for such molecules.

Card 1/1

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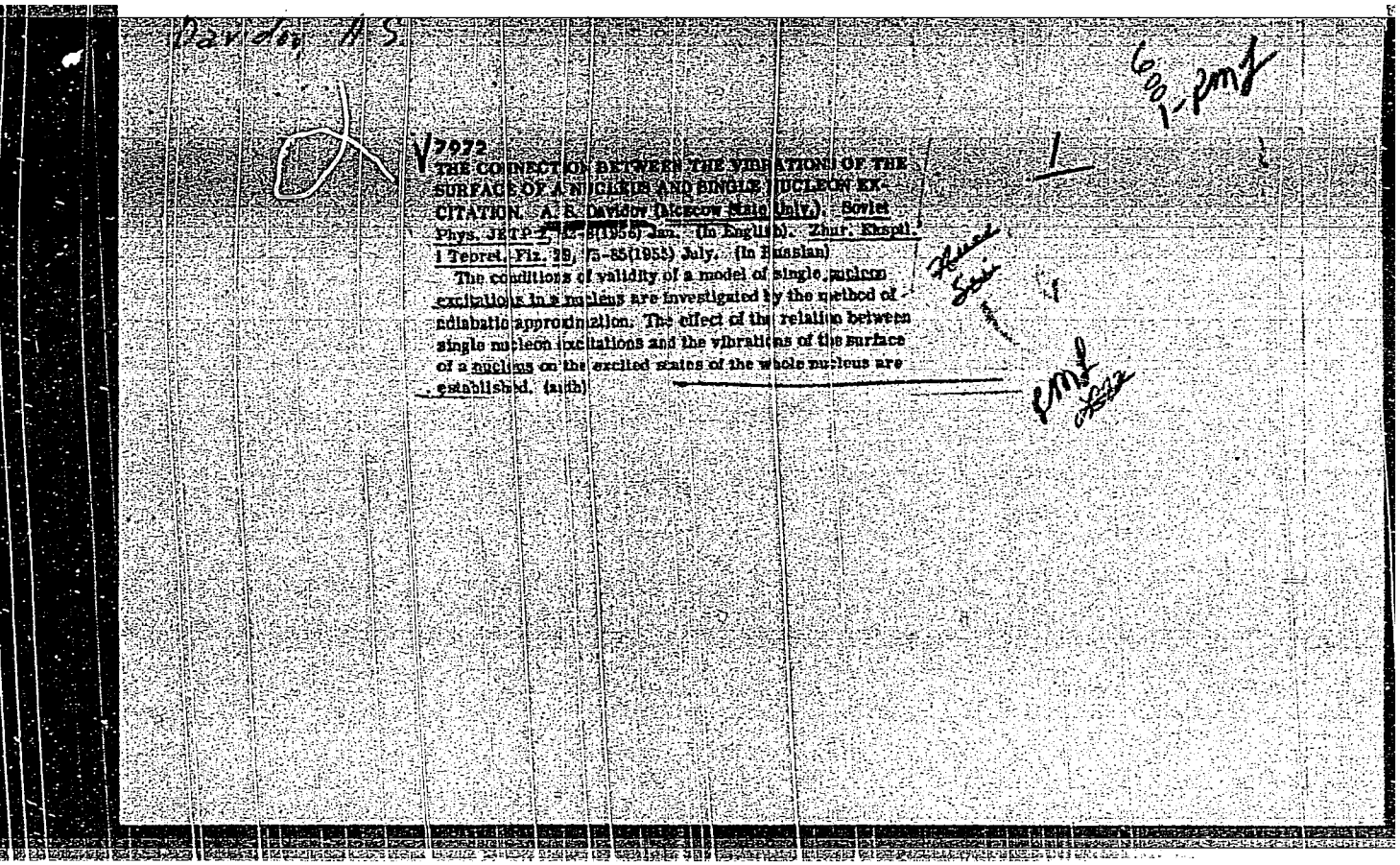

V7972
THE CONNECTION BETWEEN THE VIBRATIONS OF THE SURFACE OF A NUCLEUS AND SINGLE NUCLEON EXCITATION. A. S. Davidov (Moscow State Univ.). Soviet Phys. JETP 2, 87-93(1956) Jan. (In English). Zhur. Eksptl. i Teoret. Fiz. 29, 75-85(1955) July. (In Russian)

The conditions of validity of a model of single nucleon excitation in a nucleus are investigated by the method of adiabatic approximation. The effect of the relation between single nucleon excitations and the vibrations of the surface of a nucleus on the excited states of the whole nucleus are established. (auth)

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Davydov, A.S.

2

The spectral distribution of the intensity of emission and absorption of light by molecular crystals under formation of localized excitations. A. S. Davydov and A. F. Lubchenko. *Ukrain. Fiz. Zhur.* 1, 11–27 (Russian summary 27–8) (1956). —The spectral distribution and the av. radiation lifetime of the localized excitation were calcd. on the basis of the Weisskopf-Wigner formula (cf. *C.A.* 24, 5502; 25, 1168); the nonemitting transitions were not calcd. At higher temps. the absorption and emission bands have the shape of a Gauss distribution curve. At lower temps. the asymmetry of the bands becomes pronounced, the band goes through a max. vertical to the frequency axis, and the absorption curve reaches the red end of the spectrum faster than the violet end; the luminescence curve shows a reverse trend.
Werner Jacobson

1. Inst. fizyki akademii nauk URSR
(Crystals -- optical properties)

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DAVYDOV, A.S.

"USSR/Physical Chemistry - Crystals B-5

Abs Jour : Referat Zhur - Khimiya, No 2, 1957, 3593

Author : Davydov A.S., Lubchenko A.F.
Title : Configuration of the Dispersion Curves of Molecular Crystals Corresponding to Localized Excitations

Orig Pub : Ukr. fiz. zh., 1956, 1, No 2, 111-119

Abstract : On the basis of previously obtained results (RZhKhim, 1956, 67745, 67746) were calculated the configurations of dispersion curves (DC) of molecular crystals in the region of localized excitations, at different temperatures. At high temperatures DC have a configuration analogous to that of DC of the free molecule on taking into account the Doeppler effect. On decrease of temperature DC becomes asymmetrical in relation to straight line extending through maximum of absorption band, perpendicularly to the frequency axis. At low temperatures, when the absorption spectrum separates into a system of lines,

Card 1/2 - 34 -

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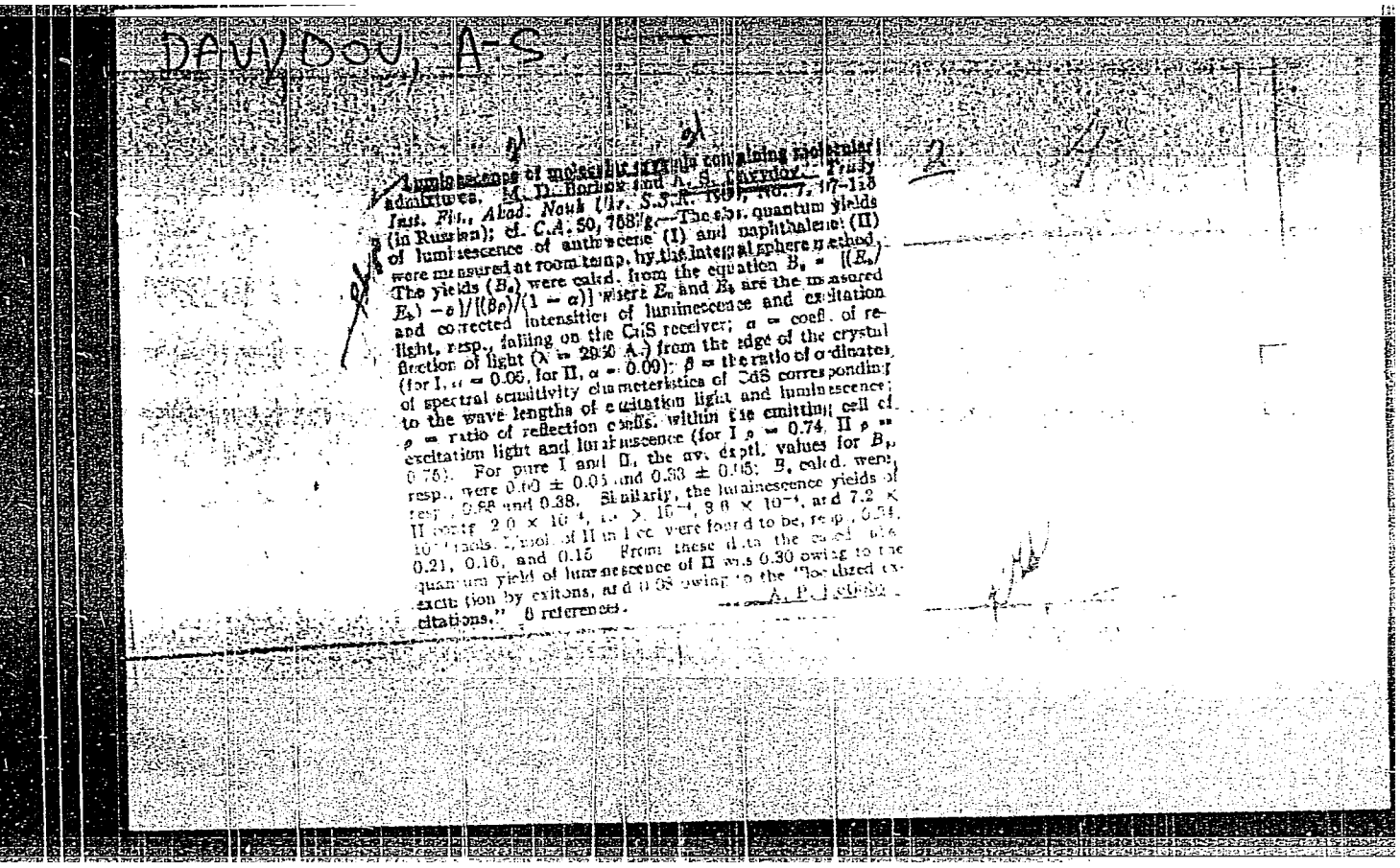

DAVYDOV, A.S.

Luminescence of molecular crystals containing molecular admixtures. M. D. Galanin and A. S. Davydov. Trudy Inst. Fiz., Akad. Nauk Ukr. S.S.R. 1958, No. 7, 117-128 (in Russian); cf. C.A. 50, 7683g.—The abs. quantum yields of luminescence of anthracene (I) and naphthalene (II) were measured at room temp. by the integral sphere method. The yields (B_0) were calcd. from the equation $B_0 = [(E_0/E_b) - a]/[(\beta\rho)/(1 - \alpha)]$ where E_0 and E_b are the measured and corrected intensities of luminescence and excitation light, resp., falling on the CdS receiver; α = coeff. of reflection of light ($\lambda = 2950$ A.) from the edge of the crystal (for I, $\alpha = 0.06$, for II, $\alpha = 0.09$); β = the ratio of ordinates of spectral sensitivity characteristics of CdS corresponding to the wave lengths of excitation light and luminescence; ρ = ratio of reflection coeffs. within the emitting cell of excitation light and luminescence (for I $\rho = 0.74$, II $\rho = 0.75$). For pure I and II, the av. exptl. values for B_0 resp., were 0.40 ± 0.05 and 0.53 ± 0.05; B_0 calcd. were 0.38 and 0.38. Similarly, the luminescence yields of I contg. 2.0×10^{-4}, $> 10^{-4}$, 3.0×10^{-4}, and 7.2×10^{-4} mols. C$_{10}$H$_8$/mol. of II in 1 cc were found to be, resp., 0.34, 0.21, 0.16, and 0.15. From these data the calcd. quantum yield of luminescence of II was 0.30 owing to the "localized excitation by exitons, and 0.68 owing to the "free" excitations." 8 references.

A. P. Jenkins

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USSR / Optics Davydov, A.S. K

Abs Jour: Referat Zhur-Fizika, 1957, No 4, 10364

Author : Davydov, A.S.
Inst : Not Given
Title : Theory of Absorption and Dispersion of Light by So,utions. II.

Orig Pub: Nauk zap. Kiivsk. un-t, 1956, 14, No 8, 5-13

Abstract: Unlike the preceding work by the author (Referat Zhur-Fizika, 1955, 1521), it is assumed that at the instant of excitation of the impurity molecule the change in the forces of interaction with the solvent leads to both a shift in the equilibrium positions for the vibrations of the solvent atoms, as well as to a change in the frequencies of vibrations themselves. General formulas are obtained for the coefficient of absorption and for the index of refraction. It is shown that if there is no change in the equilibrium positions of the solvent atoms upon excitation of the impurity molecule, the dispersion and index of absorption curves of the impurity molecules,

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DAVYDOV, A. S.

USSR/Nuclear Physics - Nuclear Reactions. C-5

Abs Jour : Ref Zhur - Fizika, No 4, 1957, 8788

Author : Davydov, A.S., Filippov, G.F.
Inst : Moscow State University.
Title : Concerning the Problem of Scattering Lengths of Slow Neutrons on Deuterons.

Orig Pub : Zh. eksperim. i teor, fiziki, 1956, 31, No 2, 340-341.

Abstract : Scattering of slow neutrons on deuterons is fully determined by two scattering lengths $a_{3/2}$ and $a_{1/2}$ corresponding respectively to two possible spin states of the system. According to the experimental data two variants of the values of the scattering length are possible. A qualitative estimate made by the authors, based on the Pauli principle, favors one of the variants, namely $a_{3/2} = 6.2 \times 10^{-3}$ cm, and $a_{1/2} = 0.8 \times 10^{-3}$ cm.

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A. S., and FILIPPOV, G. F.

"Collective Excitation of Even-Even Atomic Nuclei

paper included in the program of the All-Union Conf. on Nuclear Reactions in Medium and low Energy Physics, Moscow, 19-27 Nov. 1957.

Moscow State University.

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"APPROVED FOR RELEASE: Thursday, July 27, 2000 CIA-RDP86-00513R00050982

DAVYDOV, A.S.

AGRANOVICH, V. M., DAVYDOV, A. S. (Acad. Sci. USSR)

"Optical Model of Nucleons-Nuclei Interaction in the Resonance Region of the Compound Nucleus,"

paper submitted at the All-Union Conf. on Nuclear Reactions in Medium and Low Energy Physics, Moscow, 19-27 Nov 1957.

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Distr: 4E3n/4E4o

Light absorption in molecular crystals at weak interaction between excitons and phonons. A. S. Davydov and E. I. Rashba. *Ukrain. Fiz. Zhur.* 2, 226–40 (1957).—The fundamental absorption spectra of mol. crystals were investigated mathematically for the case of such weak interaction that the electronic transition is accompanied by the generation or absorption of one phonon. The calcns. were first made for linear chains, then extended to 2- and 3-dimensional crystals with arbitrary structure where the law of interaction between mols. still would hold true. The absorption intensity distribution was detd. for the background, if exciton interaction occurs with the optical and the acoustical crystal vibrations. The background contours depend essentially on the nos. of dimensions of the crystal structure. If the width of the exciton band $\Delta\varepsilon$ is of the same order or greater than the av. phonon energy $\hbar\nu$, then the displacement of the background max. with respect to the line of non-phonon transitions depends essentially on the structure of the exciton band and such max. never coincide with the boundary frequencies of the lattice vibrations; interaction with one vibration branch can lead to the simultaneous appearance of several background max. If $\Delta\varepsilon \ll \hbar\nu$ the sepn. of the satellites in one-dimensional chains can in certain cases coincide with the boundary frequencies. On the other hand, max. displacements in 3-dimensional crystals always correspond to certain intermediate values of vibration frequencies. Therefore, the shifting of the background max. in the spectra of the mol. crystals cannot be compared with the vibrations found from Raman dispersion (the "gross" frequencies). This conclusion is confirmed by the expt.

Werner Jacobsen

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